

MILLEROCAULIS, A NEW GENUS WITH SPECIES
FORMERLY IN OSMUNDACAULIS
MILLER (FOSSILS: OSMUNDACEAE)

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ABSTRACT

Millerocaulis first used by Erasmus and mentioned by Herbst for Miller's previously proposed "*Osmundacaulis herbstii* group" is discussed and validated. *Osmundacaulis*, as now restricted, includes only members of Miller's "*O. skidegatensis* group." A new informal group "*O. boskingii*" is proposed for *Osmundacaulis* (sensu stricto) containing an adaxial crenate-shaped sclerenchyma mass in their leaf and/or petiole traces. New nomenclatural combinations include: *Millerocaulis amajolensis* (Sharma) Tidwell, *Millerocaulis beardmorensis* (Schopf) Tidwell, *Millerocaulis dunlopii* (Kidston & Gwynne-Vaughn) Tidwell, *Millerocaulis estipularis* (Sharma, Bohra & Singh) Tidwell, *Millerocaulis gibbiana* (Kidston & Gwynne-Vaughn) Tidwell, *Millerocaulis guptai* (Sharma) Tidwell, *Millerocaulis hebeiensis* (Wang) Tidwell, *Millerocaulis herbstii* (Archangelsky & de la Sota) Tidwell, *Millerocaulis indica* (Sharma) Tidwell, *Millerocaulis kidstonii* (Stopes) Tidwell, *Millerocaulis kolbei* (Seward) Tidwell, *Millerocaulis patagonica* (Archangelsky & de la Sota) Tidwell, *Millerocaulis rajmahalensis* (Gupta) Tidwell, *Millerocaulis sahnii* (Mittre) Tidwell, and *Millerocaulis wadei* (Tidwell & Rushforth) Tidwell.

INTRODUCTION

The organ genus *Osmundacaulis* was established by Miller (1967) as the name of a new taxon, that he thought was a new name for the illegitimate later homonym *Osmundites* Unger (1854), non Jaeger (1827), but technically was not. In order to have been a new name for *Osmundites*, *Osmundacaulis* would have required the same type as *Osmundites*. However, Miller (1967, 1971) explicitly excluded Unger's type *O. schennicensis* (von Pettko) Unger (treated in *Osmunda*), established a different type for *Osmundacaulis* [*O. skidegatensis* (Penhallow) Miller], and gave a validating description.

Osmundacaulis was instituted and named for petrified axes exhibiting general anatomical features of living members of the Osmundaceae, but because they differ anatomically from these members, they cannot be assigned to an extant genus of this family. Miller (1967, 1971) proposed three informal groups within *Osmundacaulis*: the "*Osmundacaulis herbstii* group," the "*O. brazilensis* group" and the "*O. skidegatensis* group." These groups were based upon distinctive anatomical features. These features in-

cluded the thickness of the xylem cylinder, the number of clusters of protoxylem cells in each trace as they departed from the xylem strands and the degree of differentiation of the inner and outer cortices.

The "*O. braziliensis* group," in which the axis lacks a definite sclerotic outer cortex and stipular wings, was proposed as the new genus *Guairea* Herbst. It was removed from the Osmundaceae and placed in the new family Guaireaceae (Herbst 1981).

The "*Osmundacaulis herbstii* group" was proposed as the new genus *Millerocaulis* by Erasmus in his unpublished doctoral dissertation (1978). Because this does not constitute effective publication, the generic name was not effectively published (Art. 29). Herbst (1981:37) accepted Erasmus' *Millerocaulis* but failed to validate it with a description (Art. 32.1). Therefore, *Millerocaulis* is validated here for the first time.

TAXONOMY

Millerocaulis Erasmus ex Tidwell

Fossil osmundaceous rhizomes, rarely arborescent axes, containing stem or stems surrounded by a mantle of leaf bases and roots. Stele ectophloic-dictyoxylic-siphonostele (Miller 1971) with a xylem cylinder approximately 15 tracheids thick. Leaf trace separates from the xylem cylinder with only one protoxylem cluster and often, but not always, lacks axillary sclerenchyma. Petiole bases stipulate and adventitious roots arise either singly or in pairs.

TYPE: *M. dunlopii* (Kidston & Gwynne-Vaughn) Tidwell (*Osmundites dunlopii* Kidston & Gwynne-Vaughn "*dunlopi*").

The generic name honors Dr. Charles N. Miller, Jr. of the University of Montana at Missoula for his contribution to our knowledge of the phylogeny of the Osmundaceae. The list of species assigned to *Millerocaulis* and their synonyms are as follows:

MILLEROCAULIS amajolensis (Sharma) Tidwell, comb. nov. *Osmundacaulis amajolensis* Sharma, Palaeontographica 140B:156. 1973.

MILLEROCAULIS beardmorensis (Schopf) Tidwell, comb. nov. *Osmundacaulis beardmorensis* Schopf, Can. J. Bot. 56:3034. 1978.

MILLEROCAULIS dunlopii (Kidston & Gwynne-Vaughn) Tidwell, comb. nov. *Osmundites dunlopii* Kidston & Gwynne-Vaughn, Trans. Roy. Soc. Edinb. 45(I):759. 1907 ("*dunlopi*"). *Osmundacaulis dunlopii* (Kidston & Gwynne-Vaughn) Miller, Contr. Mus. Paleo. Univ. Mich. [21:146. 1967 ("*dunlopi*"), nom. invalid. under Art. 33.2 - no page reference to basionym] 23:135. 1971.

Osmundites aucklandicus Marshall, Trans. and Proc. N.Z. Inst. 56:210. 1924.

- MILLEROCAULIS estipularis** (Sharma et al.) Tidwell, comb. nov. *Osmundacaulis estipularis* Sharma, Bohra & Singh, Phytomorphology 8:61. 1979 ("estipulare").
- MILLEROCAULIS gibbiana** (Kidston & Gwynne-Vaughn) Tidwell, comb. nov. *Osmundites gibbiana* Kidston & Gwynne-Vaughn, Trans. Roy. Soc. Edinb. 45(1):763. 1907 *Osmundacaulis gibbiana* (Kidston & Gwynne-Vaughn) Miller, Contr. Mus. Paleo. Univ. Mich. [21:146. 1967, nom. invalid. under Art. 33.2 - no page reference to basionym] 23:136. 1971.
- MILLEROCAULIS guptai** (Sharma) Tidwell, comb. nov. *Osmundacaulis guptai* Sharma, Palaeontographica 140B:154. 1973.
- MILLEROCAULIS hebeiensis** (Wang) Tidwell, comb. nov. *Osmundacaulis hebeiensis* Wang, Rev. Palaeobot. Palyn. 39:93. 1983.
- MILLEROCAULIS herbstii** (Archangelsky & de la Sota) Tidwell, comb. nov. *Osmundites herbstii* Archangelsky & de la Sota, Ameghiniana 3:135. 1963. *Osmundacaulis herbstii* (Archangelsky & de la Sota) Miller, Contr. Mus. Paleo. Univ. Mich. [21:146. 1967, nom. invalid. under Art. 33.2 - no page reference to basionym] 23:134. 1971.
- MILLEROCAULIS indica** (Sharma) Tidwell, comb. nov. *Osmundacaulis indica* Sharma, Palaeontographica 140B:157. 1973.
- MILLEROCAULIS kidstonii** (Stopes) Tidwell, comb. nov. *Osmundites kidstonii* Stopes, Ann. Bot. 35:55. 1921 ("kidstoni"). *Osmundacaulis kidstonii* (Stopes) Miller, Contr. Mus. Paleo. Univ. Mich. [21:146. 1967 ("kidstoni"), nom. invalid. under Art. 33.2 - no page reference to basionym] 23:136. 1971.
- MILLEROCAULIS kolbei** (Seward) Tidwell, comb. nov. *Osmundites kolbei* Seward, Geol. Mag., N.S.V. 4:482. 1907. *Osmundacaulis kolbei* (Seward) Miller, Contr. Mus. Paleo. Univ. Mich. [21:146. 1967, nom. invalid. under Art. 33.2 - no page reference to basionym] 23:136. 1971.
- MILLEROCAULIS patagonica** (Archangelsky & de la Sota) Tidwell, comb. nov. *Osmundites patagonica* Archangelsky & de la Sota, Ameghiniana 2(9):153. 1962. *Osmundacaulis patagonica* (Archangelsky & de la Sota) Miller, Contr. Mus. Paleo. Univ. Mich. [21:146. 1967, nom. invalid. under Art. 33.2 - no page reference to basionym] 23:136. 1971.
- MILLEROCAULIS rajmahalensis** (Gupta) Tidwell, comb. nov. *Osmundites rajmahalensis* Gupta, Proc. Ind. Sci. Congr. Varanasi, 55:428. 1968. *Osmundites rajmahalensis* Gupta, Palaeontographica 130B:174. 1970. *Osmundacaulis rajmahalensis* (Gupta) Sharma, Palaeontographica 140B:152. 1973.
- MILLEROCAULIS sahnii** (Mittre) Tidwell, comb. nov. *Osmundites sahnii* Mittre, Palaeobotanist 4:113. 1955. *Osmundacaulis sahnii* (Mittre) Miller, Contr. Mus. Paleo. Univ. Mich. [21:146. 1967, nom. invalid. under Art. 33.2 - no page reference to basionym] 23:135. 1971.
- MILLEROCAULIS wadei** (Tidwell & Rushforth) Tidwell, comb. nov. *Osmundacaulis wadei* Tidwell & Rushforth, Bull. Torrey Bot. Club 97:137. 1970.

OSMUNDACAULIS Miller emend. gen.

Emended diagnosis: Fossil osmundaceous axes, usually arborescent or erect, rarely rhizomatous; a xylem cylinder 25 or more tracheids thick dis-

sected into relatively high number of xylem strands; leaf trace strongly curved, protoxylem divides before leaving the stele; sclerenchyma usually in adaxial concavity of the trace; petioles stipulate, wings may or may not contain sclerenchyma strands; inner and outer cortical tissue well differentiated.

TYPE: *O. skidegatensis* (Penhallow) Miller (*Osmundites skidegatensis* Penhallow).

The "*Osmundacaulis skidegatensis* group" comprises a different taxon among the other members of the Osmundoideae. Thus with the formation of *Millerocaulis* and *Guaikea*, *Osmundacaulis* is reserved exclusively for members of the "*O. skidegatensis* group" (Herbst 1981). Therefore, *Osmundacaulis*, in a strict sense, consists of the species *Osmundacaulis skidegatensis* (Penhallow 1902) Miller, *O. atherstonei* (Schelpe 1956) Miller, *O. natalensis* (Schelpe 1955) Miller and *O. boskingii* Gould (1973).

The inner cortex of *Osmundacaulis* (sensu stricto) is wider than the outer. Among other members of the Osmundoideae, with the exception of *Millerocaulis wadei* (Tidwell & Rushforth 1970) Tidwell, the opposite condition is the case. The outer cortex of these other members of the Osmundoideae is very wide and the inner is thinner. In *M. wadei*, they are about equal in width. According to Miller (1971), cortical cylinders of nearly equal dimensions represent a primitive state, whereas, thicker outer and thinner inner cortices would be more advanced.

Further, two groups in *Osmundacaulis* (sensu stricto) are proposed. One of these groups would contain only *O. skidegatensis* (Penhallow 1902) Miller and the other, designated the "*Osmundacaulis boskingii* group," is represented by arborescent and rhizomatous taxa having crenate-shaped adaxial sclerenchyma mass in their leaf traces and/or petiole vascular strands. At present, these forms have been reported exclusively from the Southern Hemisphere and include *O. atherstonei* (Schelpe 1956) Miller, *O. natalensis* (Schelpe 1955) Miller and *O. boskingii* Gould. The crenate-shaped adaxial sclerenchyma in the trace is not present in *O. skidegatensis*. In this species, the sclerenchyma of the trace and petiolar vascular strand is a single mass connecting downward with similar cells in the pith (Miller 1971).

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